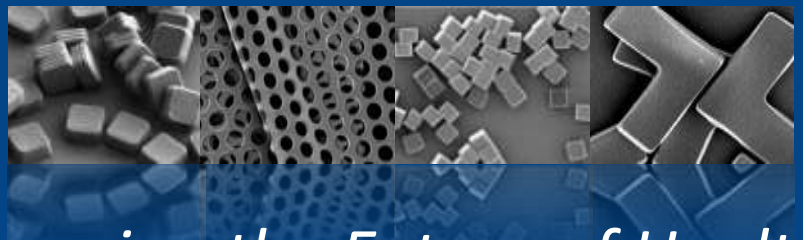
LIQUIDIA TECHNOLOGIES



Precisely Engineering the Future of Healthcare

LIQUIDIA TECHNOLOGIES

Healthcare Needs Nanotechnology

- Industry Issues
  - Rapidly eroding patent protection
  - Increasing need for more effective products
  - Growing regulatory pressures
  - Accelerating cost pressure and proof-of-cost benefit

"We spend billions each year to get innovation, but where does innovation come from, and how do we get more of it?... We need transformational change."

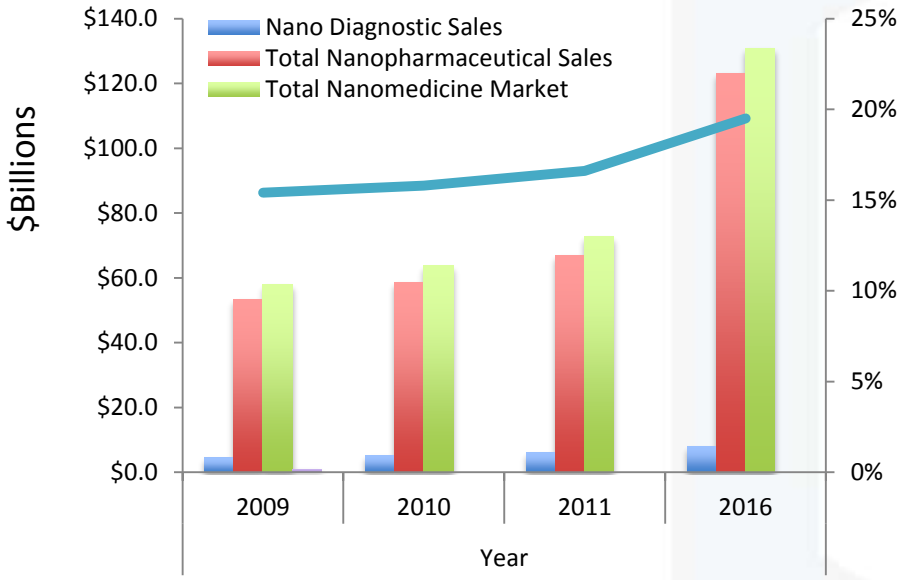
- Bernard Munos, InnoThink Center for Research in Biomedical Innovation

LIQUIDIA TECHNOLOGIES

Nanotechnology: The Potential to Transform Product Development

Nanomedicine market Estimated to reach $130.9 billion

Source: BCC Nanomedice Market Forecast - 2012



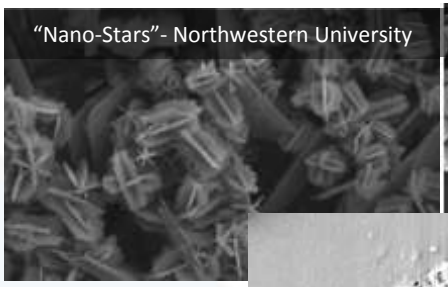
Chantecaille ™

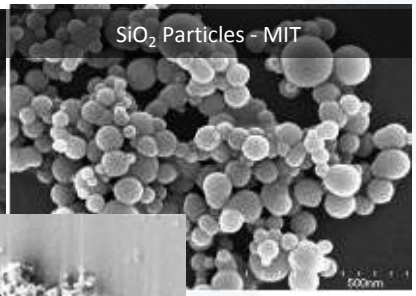
Abraxane™

Sunstick™

Current Technologies aren't sufficient to realizing the full opportunity.

- Limitations in particle design parameters
- Lack particle consistency and reproducibility
- Scale and cost challenges
- Growing regulatory pressures





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FDA Advisory Committee Comments

- "Nanotechnology has great potential to impact medical research and drug discovery"
- Further work on characterization should be done
  - Evaluating how nanoparticle size and shape effect drug PK and PD
    - Change in particle size can affect performance
  - Traditional analytics may not be adequate
- Further guidance needed
  - Including additional studies required for a change to nanosized API

LIQUIDIA TECHNOLOGIES

From Aug meeting of FDA Advisory Committee on Pharmaceutical Sciences and Clinical Pharmacology

Key Ingredients for Continued Strong Growth of Nanotechnology in Health Care?

- Compelling product efficacy and safety data
- Multi-disciplinary collaborations
- Scalable, well-characterized, cost-effective manufacturing
- Clear and reasonable regulatory guidelines
- Funding
- Evangelical pursuit and excellent execution

LIQUIDIA TECHNOLOGIES

Liquidia Corporate Profile

- Founded in 2004
- Located in RTP, NC
- Novel technology platform
- Strong patent protections
- Experienced management team
- Robust investor syndicate
- Transformative partnerships

Story titled; "Particle Technology Delivers Medicines and Vaccines"

pappas VENTURES · MORNINGSIDE · BILL & MELINDA GATES foundation · CANAAN PARTNERS · NEA · PPD

LIQUIDIA TECHNOLOGIES

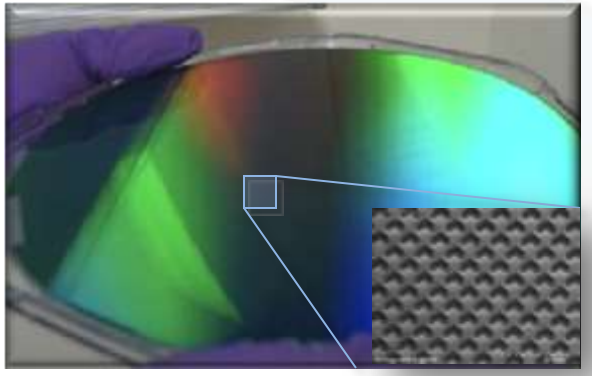
Gaining Momentum

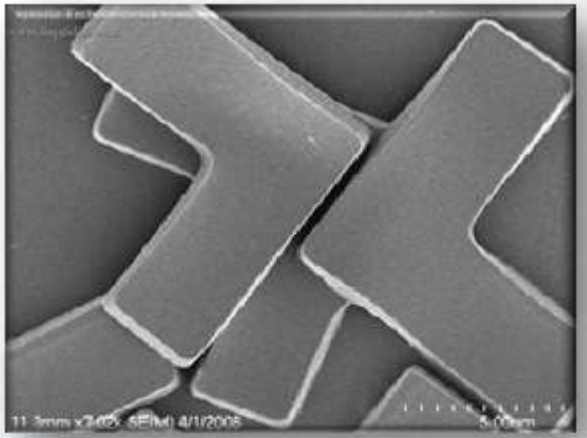
Liquidia is poised to be a leader in the development of nanotechnology-based healthcare products and a catalyst for the growth anticipated across this industry.

LIQUIDIA TECHNOLOGIES

Precise. Powerful. PRINT®

- PRINT (Particle Replication in Non-wetting Templates) Platform:
  - Utilizes the precision of the microelectronics industry
  - Transforms particle engineering and product development
  - Offers a scalable, cost-effective manufacturing platform



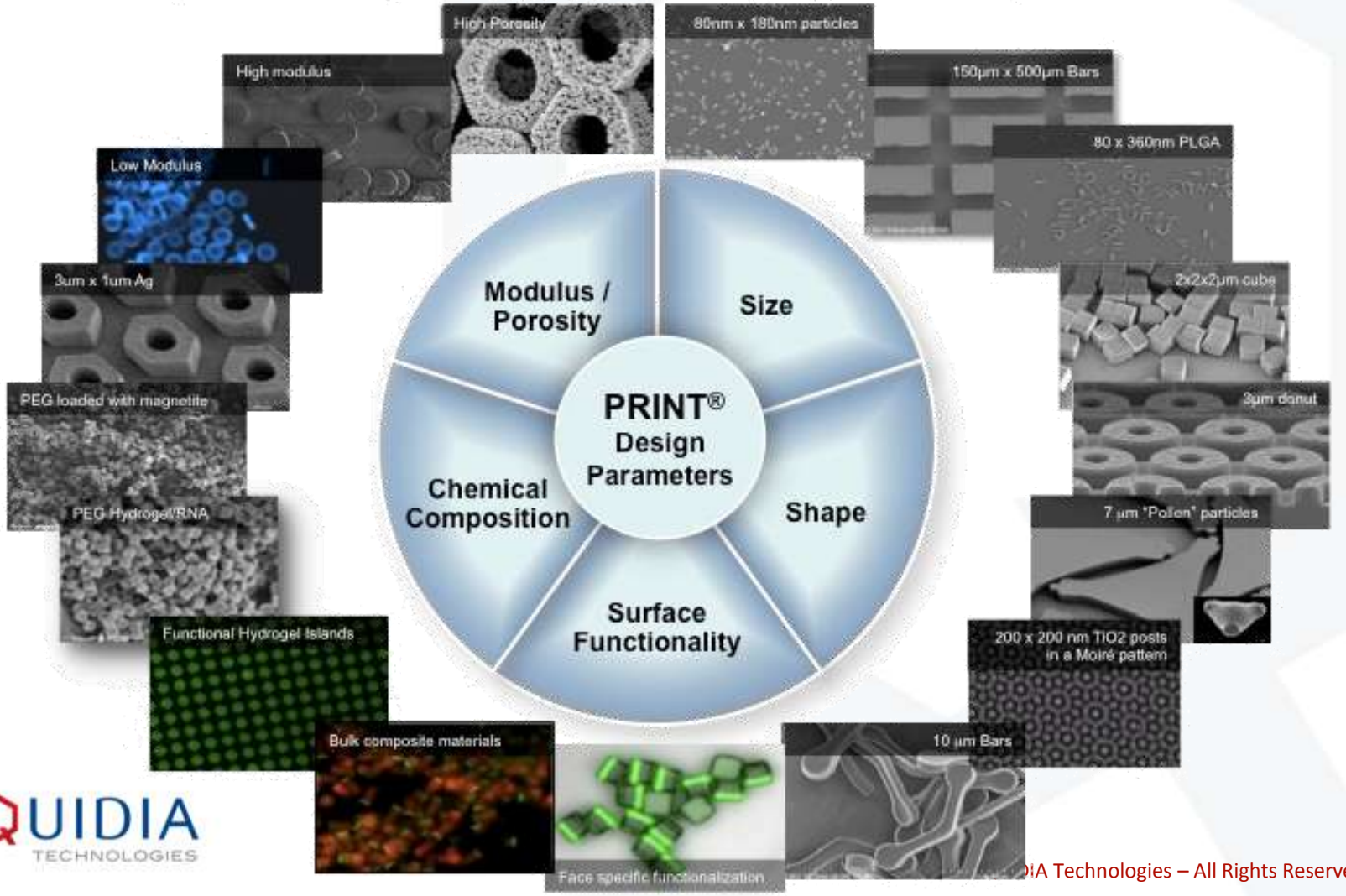


PRINT is revolutionizing the way that companies engineer healthcare products

LIQUIDIA TECHNOLOGIES

Library of Precisely Engineered Particles

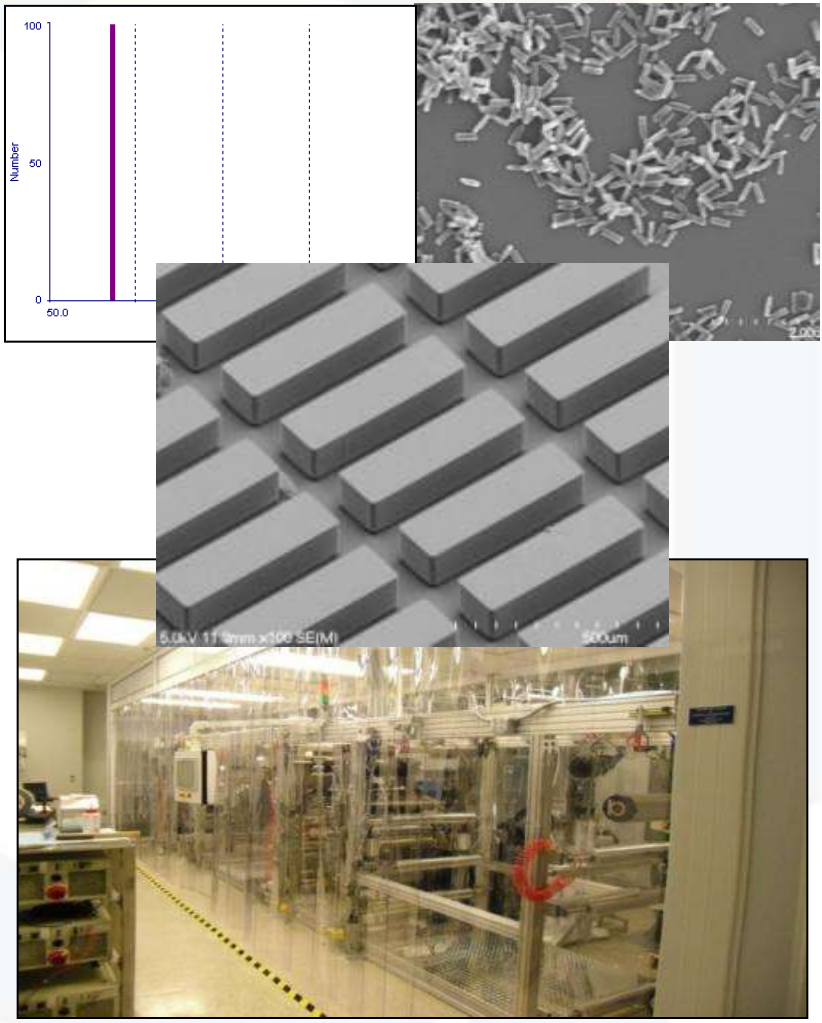
PRINT is the only technology in the world that enables independent design of particle size, shape and chemistry



LIQUIDIA TECHNOLOGIES

PRINT Manufacturing Advantages

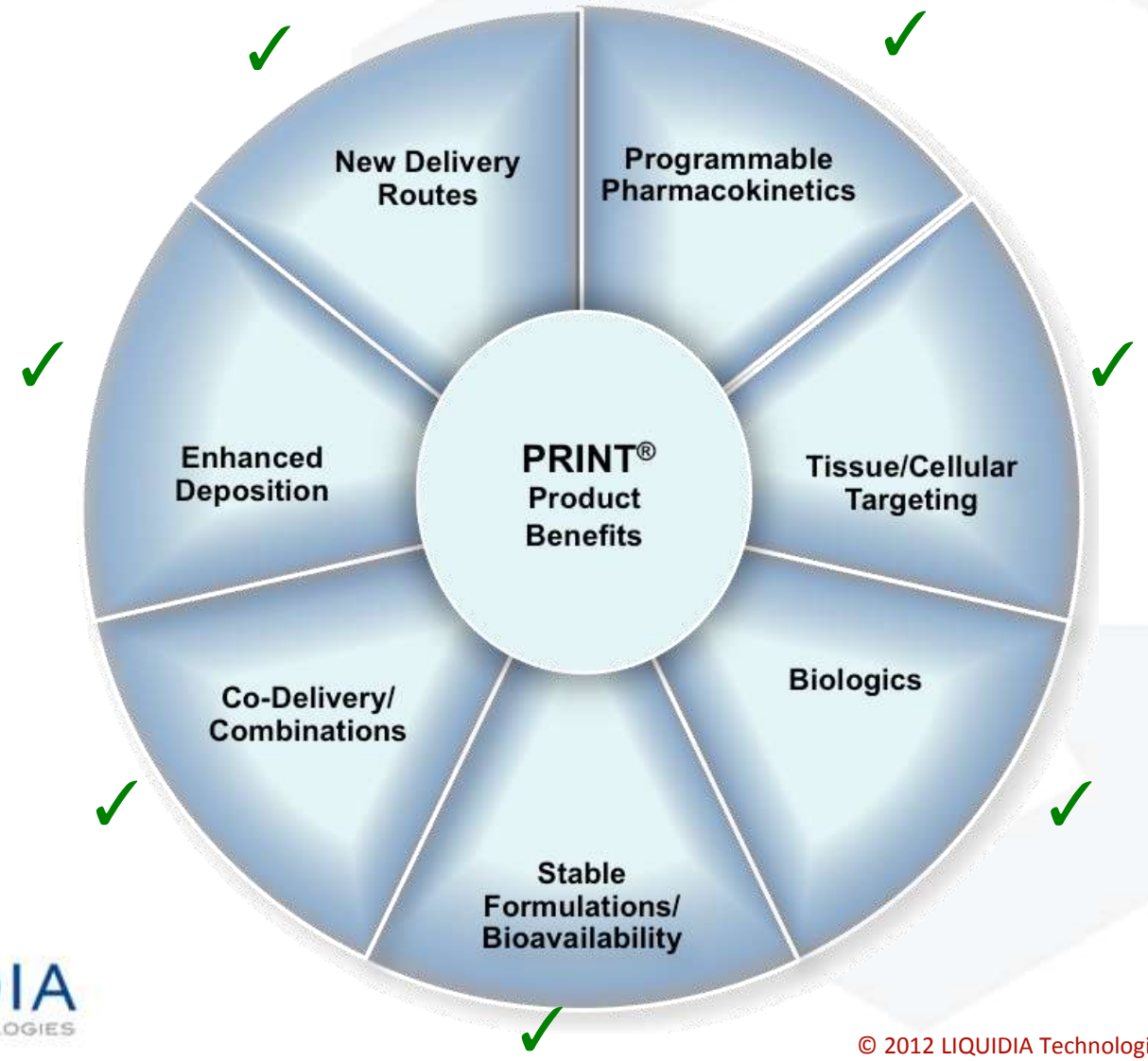
- Quality by Design:
  - Precise control of size, shape and composition
  - Uniform particle population, easily characterized
  - Demonstrated batch-to-batch consistency
- Scalable cGMP Manufacturing Platform:
  - Existing cGMP manufacturing capability
  - Leveraging the breadth of Roll-to-Roll technology
  - Commercially Relevant Scale and Cost
- Minimal Facilities Burden:
  - Small footprint, low CapEx equipment
  - Low bioburden process, minimal water needs (reduced maintenance and monitoring cost)
  - No exotic utilities (drop-in-place equipment)
  - Concept for aseptic manufacturing, if required



Supported by robust IP portfolio and "know-how": ***protection from competition***

LIQUIDIA TECHNOLOGIES

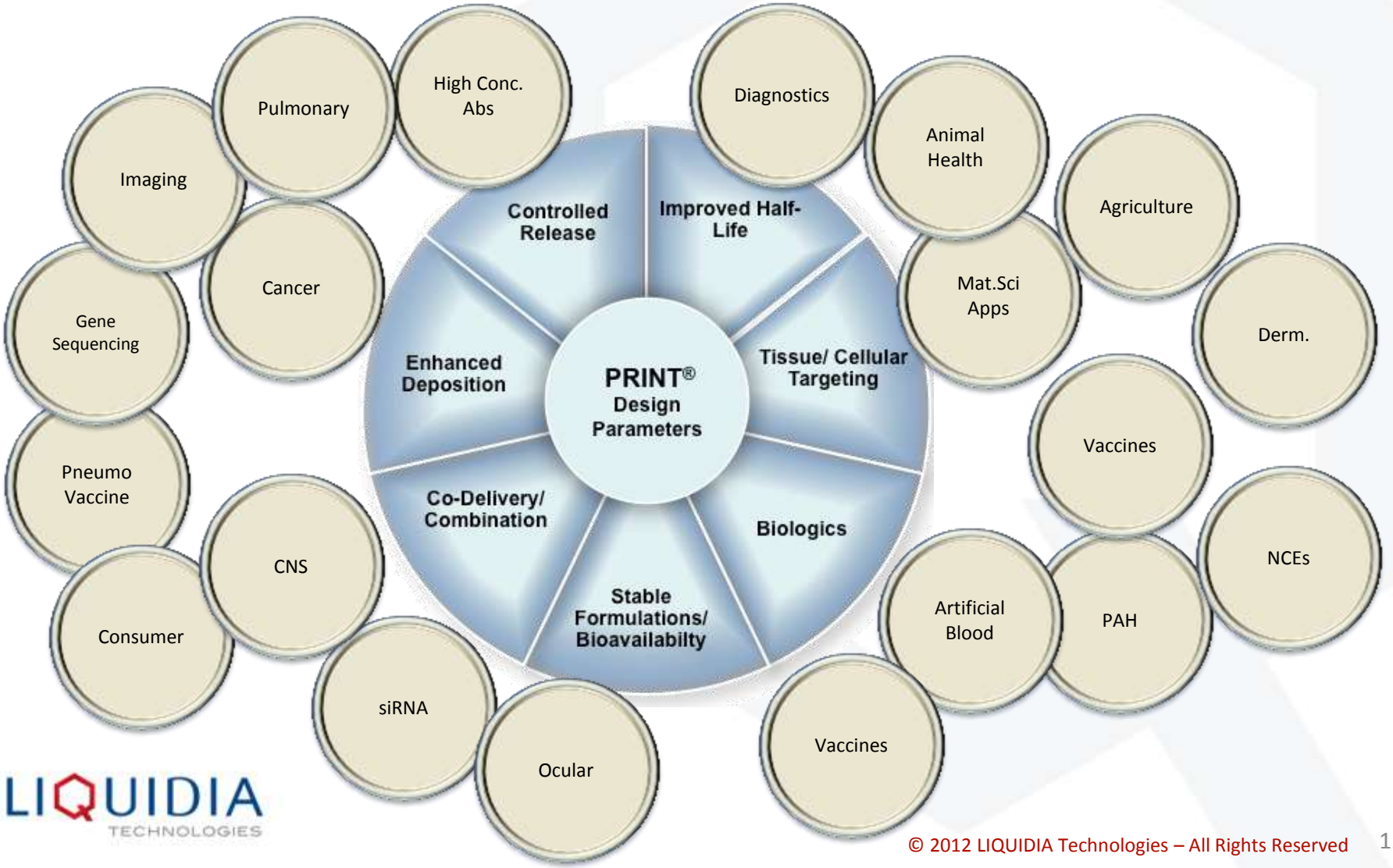
PRINT Particles have Broad Product Benefits



LIQUIDIA TECHNOLOGIES

PRINT Benefits Can Drive Products in Many Large Markets

PRINT offers the potential to create innovative products across large markets

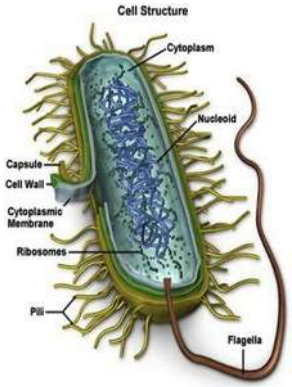


LIQUIDIA TECHNOLOGIES

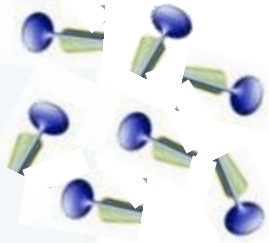
Liquidia Enables Next Generation Vaccines

PRINT Vaccines Offer the Potential for Rationally Designed Vaccines Optimizing Efficacy, Safety and Cost for New and Existing Targets

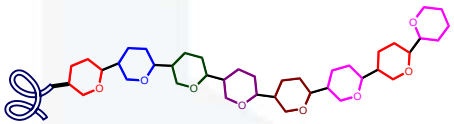
1st Generation: Whole Pathogens



2nd Generation: Sub-Unit and Nucleic Acids



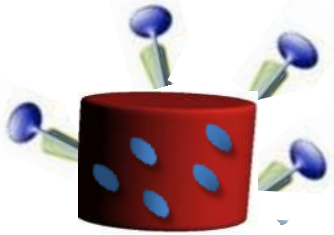
Sub-Unit Protein



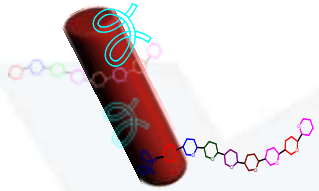
Sub-Unit
Polysaccharide Conjugates

Nucleic Acids:
Vectored or Naked

Next Generation: PRINT Vaccines



Protein-Adjuvant Co-delivery



Virtual-conjugates

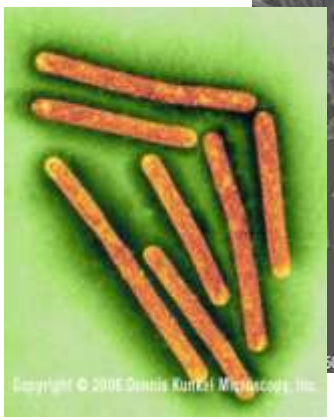
Synthetic Delivery System

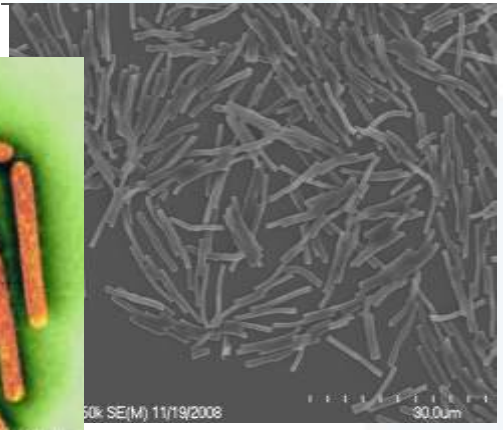
LIQUIDIA TECHNOLOGIES

Potential Benefits of PRINT Vaccines

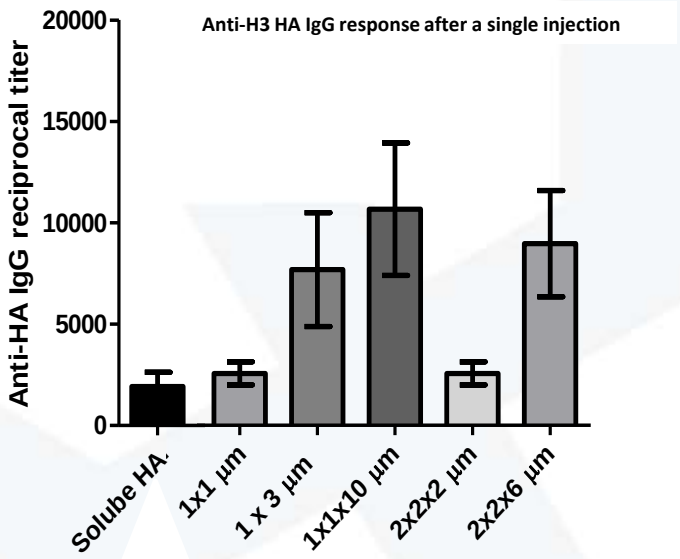
- Controlled loading of components (antigens, proteins, adjuvants, etc.) to optimize safety, efficacy and cost
- Unique particle sizes and shapes to enhance immune response and improve manufacturing
- Highly consistent, scalable manufacturing with attractive vaccine COGS

Avian Influenza





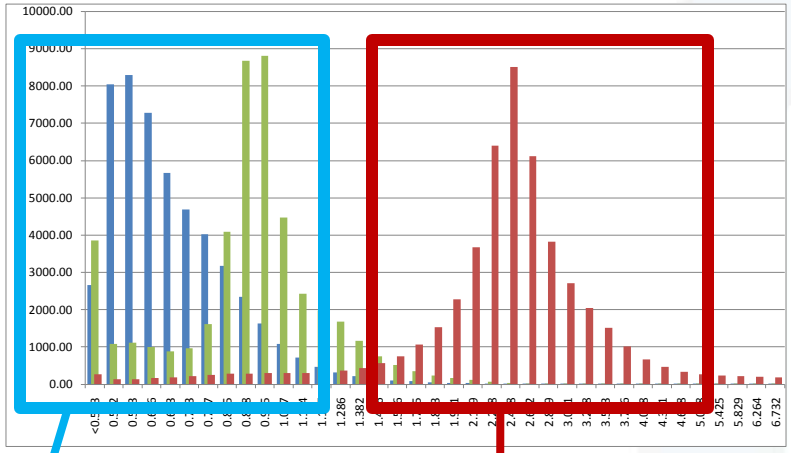
1x1x10 micron PRINT Particles



LIQUIDIA TECHNOLOGIES

PRINT has Potential in Pulmonary Medicine

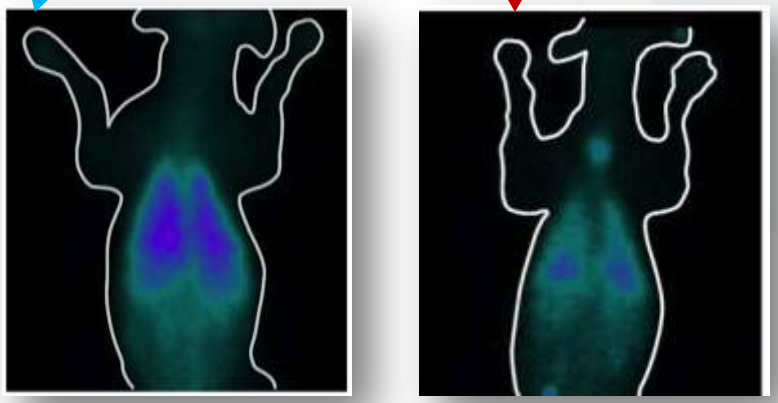
Tunable Aerodynamic Properties

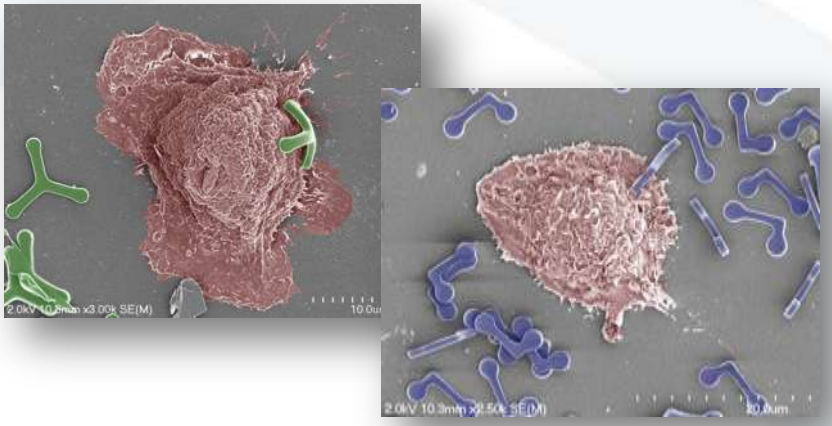


Particle #1
AD: 0.65
GSD: 1.25

Particle #2
AD: 1.09
GSD: 1.25

Particle #3
AD: 2.45
GSD: 1.49





Enhanced Pulmonary Delivery

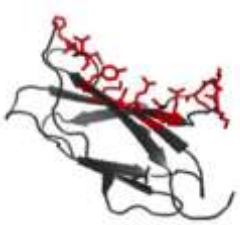
	Marketed DPI Product	PRINT DPI
Fill wt.	5 mg	5 mg
MMAD	3.4 μm	2.2 μm
Respir. Dose	1200 μg	2900 μg
FPF	25%	83%
< 1.6 μm	220 μg	1000 μg

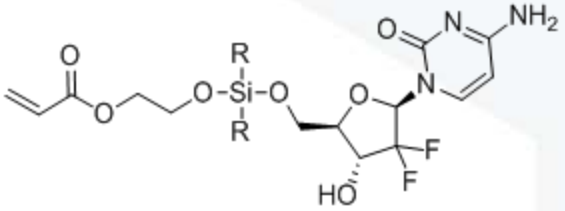
LIQUIDIA TECHNOLOGIES

Unlocking the Next Frontier in Cancer Therapeutics

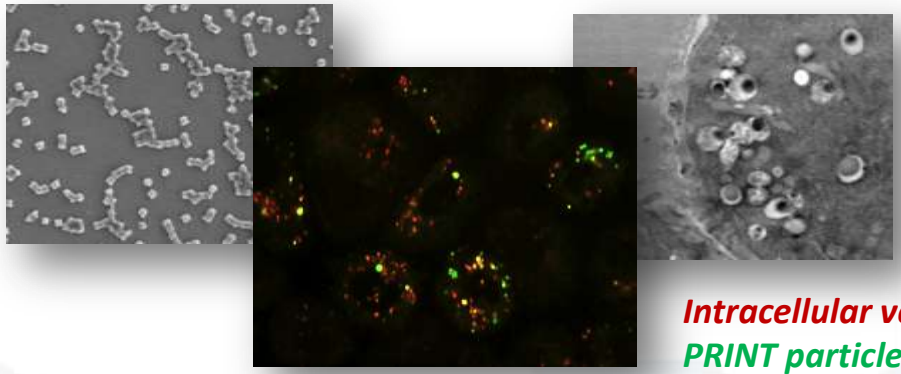
Novel Therapeutics and Targeting Molecules

- Small molecules
- Biologics (e.g. engineered proteins)



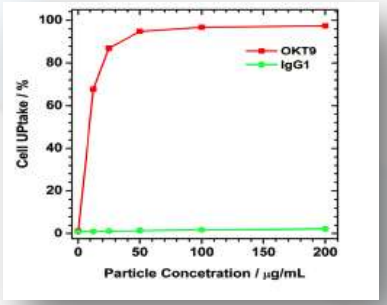


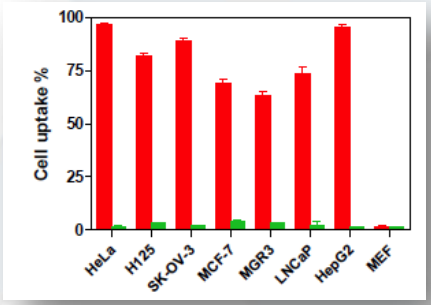
PRINT nanoparticles for systemic and intracellular delivery



Intracellular vesicle
PRINT particles

Surface targeting for enhanced selectivity





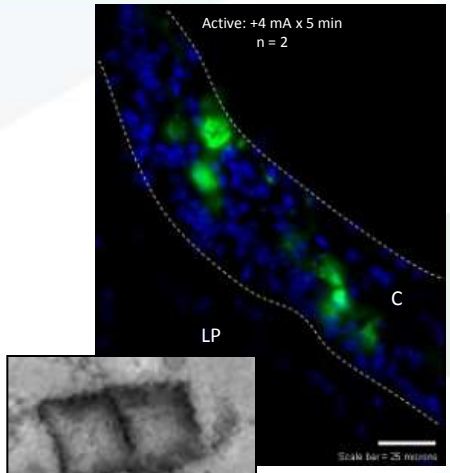
LIQUIDIA TECHNOLOGIES

Opportunities for PRINT in Ocular Drug Delivery

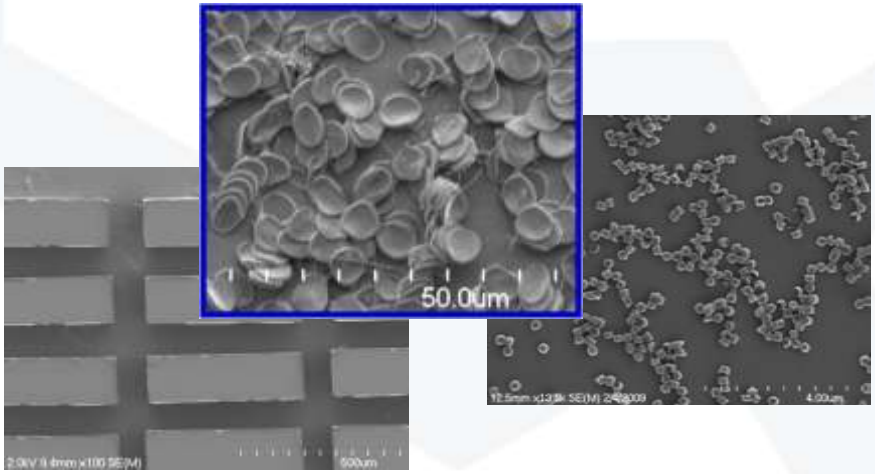
- Iontophoretic delivery
  Independently modulate carrier charge and drug loading

- Local delivery with "engineered" particle designs that:
  - Minimize clearance
  - Optimize cell uptake
  - Control release kinetics

- Extended release of small molecules, biologics, siRNA

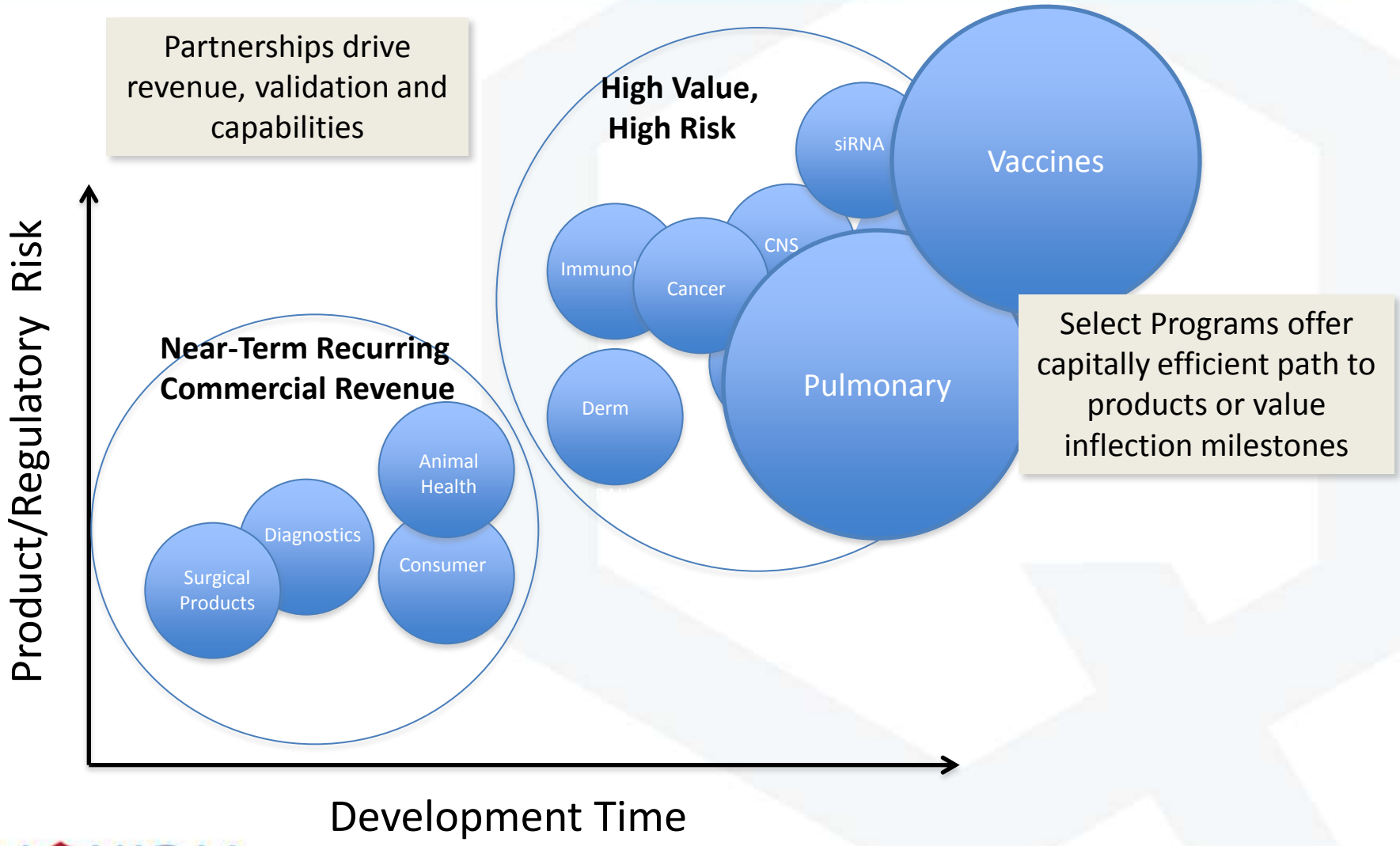


PRINT particles can translocate sclera, conjunctiva (w/ Eyegate)



LIQUIDIA TECHNOLOGIES

Business Model: Prioritize Products and Markets for Partnerships or Internal Development



LIQUIDIA TECHNOLOGIES

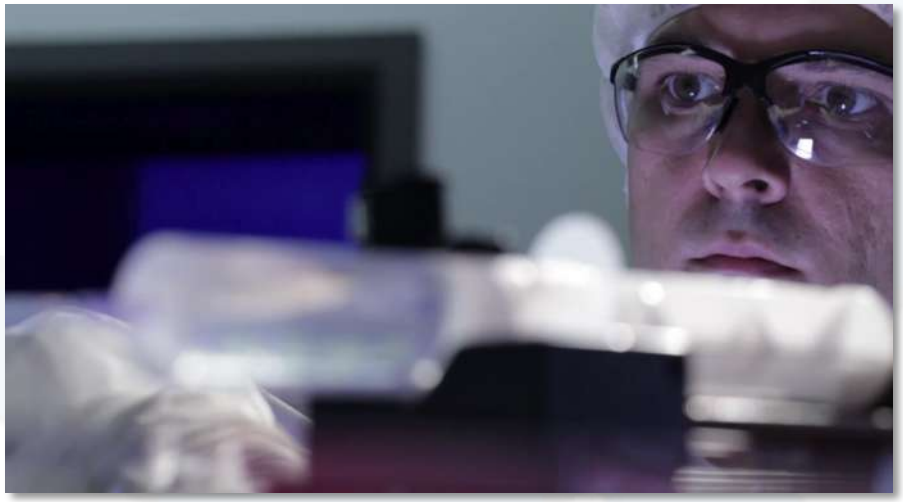
Liquidia's Plan for Successful Nano Health Care Product Commercialization

- Portfolio of products
  - select portfolio of products that balance risk and return
- Compelling Product Benefits
  - demonstrate benefit and safety of PRINT products and mechanistic understanding
- Manufacturing
  - leverage robust, regulatory friendly manufacturing platform
- Partnerships Matter
  - find motivated, experience and collaborative partners
- Execution
  - Rapidly deliver on smart, capital efficient plan

LIQUIDIA TECHNOLOGIES

One Company. One Incredibly Powerful Platform.

Through its novel technology platform and unrivaled IP positions, Liquidia is poised to be a leader in the development and manufacturing of nanotechnology-based healthcare products and a catalyst for the growth anticipated across this industry.



LIQUIDIA TECHNOLOGIES

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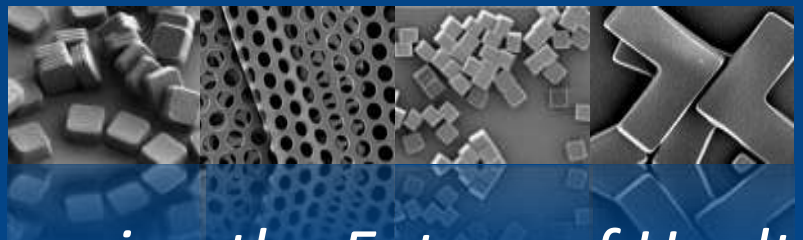

Precisely Engineering the Future of Healthcare

LIQUIDIA TECHNOLOGIES